WE CLAIM:

1. A continuous process furnace for the deposition of carbon onto a substrate material comprising:

a pre-deposition zone for accepting the substrate material and contacting the substrate material with a process gas at a temperature below the carbon deposition temperature, wherein the process gas comprises a decomposable carbon-containing species;

a carbon deposition zone in communication with the pre-deposition zone, wherein the walls of the deposition zone are spaced apart from the surface of the substrate, when present, by a distance that is small enough to allow convective and diffusive transport of the process gas to the substrate to permit substantially uniform deposition of pyrocarbon at least one of i) into pores of the substrate or ii) onto the surface of the substrate at the carbon decomposition temperature in preference to the decomposition of the process gas to produce soot and tar.

2. The continuous process furnace of claim 1, further comprising

means for introducing the carbon-containing process gas into the pre-deposition zone;

means for moving substrate material into and out of the furnace;

means for heating the furnace; and

means for removing carbon-depleted process gas from the furnace.

3. The continuous process furnace of claim 1, further comprising a cooling zone in communication with and located downstream from the carbon deposition zone.

4. The continuous process furnace of claim 1, wherein the distance between the outer surfaces of the substrate material and the inner wall surface of the carbon deposition zone does not exceed about 1 inch.

5. The continuous process furnace of claim 4, wherein the distance between the outer surfaces of the substrate material and the inner wall surface of the carbon deposition zone does not exceed about 1/4 inch.

6. The continuous process furnace of claim 1, wherein the ratio of the substrate material surface area to the carbon deposition zone inner wall surface area is sufficiently high to cause substantially uniform deposition of pyrocarbon at least one of i) into pores of the substrate or ii) onto the surface of the substrate at the carbon decomposition temperature in preference to significant deposition on the inner wall surface of the deposition zone.

7. The continuous process furnace of claim 1, wherein the walls of the carbon deposition zone comprise one of a heat resistant material and an oxidation resistant material.

8. The continuous process furnace of claim 7, wherein the heat resistant material is graphite.

9. The continuous process furnace of claim 7, wherein the oxidation resistant material is selected from the group consisting of high melting point glass, refractory ceramic, oxidation resistant metals and oxidation resistant metal alloys.

10. The continuous process furnace of claim 9, wherein the refractory ceramic is selected from the group consisting of alumina, mullite, silicon carbide, boron nitride, and silicon nitride.

11. The continuous process furnace of claim 9, wherein the high melting point glass is quartz.

12. The continuous process furnace of claim 9, wherein the oxidation resistant metal alloy is stainless steel.

13. The continuous process furnace of claim 2, wherein the means for introducing the carbon-containing process gas into the pre-deposition zone is selected from the group consisting of a tube and a pipe, or a tube or pipe fitted with heaters to avoid condensation of less volatile hydrocarbon gases.

14. The continuous process furnace of claim 2, wherein the means for moving substrate material into and out of the furnace is selected from reel to reel devices, conveyors, opposed rollers, and push-pull tables.

15. The continuous process furnace of claim 2, wherein the means for heating the furnace is selected from gas fired flame heaters, metallic electrical resistance heaters, and ceramic electrical resistance heaters.

16. The continuous process furnace of claim 2, wherein the means for removing carbon-depleted process gas from the furnace is selected from ventilated hoods, continuous exhaust tubes or pipes, and suction tubes or pipes.

17. The continuous process furnace of claim 1, wherein the substrate material is substantially flat and sheet-like.

18. The continuous process furnace of claim 2, wherein the continuous process furnace optionally further comprises an isolation zone upstream of the pre-deposition zone for excluding ambient atmosphere reactive species from the carbon deposition zone.

19. The continuous process furnace of claim 2, wherein the continuous process furnace optionally further comprises an isolation zone downstream of the carbon deposition zone for excluding carbon-depleted process gas from the ambient atmosphere.

20. The continuous process furnace of claim 18, wherein the isolation zone contain means for introducing inert gas at above ambient atmospheric pressure.

21. The continuous process furnace of claim 19, wherein the isolation zone contain means for introducing inert gas at above ambient atmospheric pressure.

22. The continuous process furnace of claim 1, wherein the carbon deposition zone, in cross section, is substantially rectangular or oval in cross section to

accommodate a sheet-like substrate material.

23. The continuous process furnace of claim 1, wherein the carbon deposition zone, in cross section, is substantially in a U shape or inverted T shape to accommodate a correspondingly shaped substrate material.

24. A continuous process for the deposition of pyrocarbon at least one of i) into pores of a substrate material or ii) onto the surface of the substrate material comprising:

introducing the substrate material into a process furnace; the process furnace comprising

a pre-deposition zone for accepting the substrate material and,

a carbon deposition zone in communication with the pre-deposition zone, wherein the walls of the deposition zone are spaced apart from the surface of the substrate, when present, by a distance that is small enough to allow convective and diffusive transport of the process gas to the substrate to permit substantially uniform deposition of pyrocarbon at least one of i) into pores of the substrate material or ii) onto the surface of the substrate material at the carbon decomposition temperature in preference to the decomposition of the process gas to produce soot and tar;

introducing a process gas into the pre-deposition zone; and contacting the substrate material with the process gas at a temperature below the carbon deposition temperature, wherein the process gas comprises a decomposable carbon-containing species;

passing the substrate material to the carbon deposition zone and heating the deposition zone to a temperature sufficient to cause decomposition of the decomposable carbon-containing species and substantially uniform deposition of pyrocarbon at least one of in the pores of or on the surface of the substrate material.

25. The process of claim 24, wherein the decomposable carbon-containing species is selected from the group consisting of natural gas, ethane, ethylene, acetylene, propane, propylene, propyne, butane, pentane, cyclopentane, hexane, cyclohexane, and mixtures thereof.

26. The process of claim 24 including heating the carbon deposition zone to a temperature of at least about 900°C.

27. The process of claim 26 including heating the carbon deposition zone to a temperature of at least about 1,100°C.

28. The process of claim 24, wherein the substrate material comprises a substantially flat, sheet-like or a thin shape.

29. The process of claim 28, wherein the substrate material is in a form selected from the group consisting of a woven fabric, a knitted fabric, a non-woven fabric, a felt, blanket, mat and a paper.

30. The process of claim 24, wherein the substrate material comprises inorganic fibers and, optionally, inorganic fiber whiskers.

31. The process of claim 30, wherein the inorganic fibers are selected from the group consisting of carbon fibers, graphite fibers, ceramic fibers, high temperature resistant glass fibers and refractory metal fibers.

32. The process of claim 31, wherein the carbon fibers are derived from a precursor material selected from the group consisting of PAN, petroleum pitch and rayon.

33. The process of claim 31, wherein the ceramic fibers are selected from the group consisting of silicon carbide, boron nitride, silicon nitride, alumina and alumino-silicates.

34. The process of claim 30, wherein the inorganic fiber whiskers are selected from the group consisting of carbon whiskers and ceramic whiskers.

35. A substantially uniformly carbon-densified or carbon-coated substrate material product produced by a continuous carbon deposition process comprising:

introducing the substrate material into a process furnace; the process furnace comprising

a pre-deposition zone for accepting the substrate material and,

a carbon deposition zone in communication with the pre-deposition zone, wherein the walls of the deposition zone are spaced apart from the surface of the substrate, when present, by a distance that is small enough to allow convective and diffusive transport of the process gas to the substrate to permit substantially uniform deposition of pyrocarbon at least one of i) into pores of the substrate material or ii) onto the surface of the substrate material at the carbon decomposition temperature in preference to the decomposition of the process gas to produce soot or tar;

introducing a process gas into the pre-deposition zone; and contacting the substrate material with the process gas at a temperature below the carbon deposition temperature, wherein the process gas comprises a decomposable carbon-containing species;

passing the substrate material to the carbon deposition zone and heating the deposition zone to a temperature sufficient to cause decomposition of the decomposable carbon-containing species and substantially uniform deposition of pyrocarbon at least one of in the pores of or on the surface of the substrate material.

36. A coated nonporous substrate material having a highly ordered pyrolytic graphite coating produced by the process of claim 35.

37. A composite article comprising a carbon-coated or carbon-densified fibrous substrate material produced by the process of claim 35.

38. A composite article produced by the process of claim 37, wherein the fibrous substrate comprises inorganic fibers and, optionally, inorganic fiber whiskers.

39. The fibrous substrate material and resulting composite article produced by the process of claim 35, comprising a substantially flat, sheet-like or thin shape.

40. The fibrous substrate material and composite article produced by the process of claim 35, comprising a shaped structure of substantially uniform thickness.

41. A composite article produced by the process of claim 40, wherein the shaped structure is in the form of a U or a T.

42. A continuous roll composite material comprising a fibrous substrate having a pyrocarbon addition that is (i) coated onto the fibrous substrate and/or (ii) infiltrated into the porosity of the fibrous substrate, wherein the variation in the mass of the pyrocarbon addition is less than about 20 weight percent, as determined by measuring sections of the composite material having the dimensions of 2 square feet taken at various positions along the length of the continuous roll.

43. The continuous roll composite material of claim 42, wherein the variation in the mass of the pyrocarbon addition is less than about 10 weight percent.

44. The continuous roll composite material of claim 43, wherein the variation in the mass of the pyrocarbon addition is less than about 5 weight percent.

45. The continuous roll composite material of claim 42, wherein the fibrous substrate comprises one of inorganic fibers and inorganic fiber whiskers.

46. The continuous roll composite material of claim 42, wherein the fibrous substrate material comprises a substantially flat, sheet-like or a thin shape.

47. The continuous roll composite material of claim 46, wherein the fibrous substrate material is in a form selected from the group consisting of a woven fabric, a knitted fabric, a non-woven fabric, a felt, blanket, mat, web and a paper.

48. The continuous roll composite material of claim 42, wherein the fibrous substrate material comprises inorganic fibers and, optionally, inorganic fiber whiskers.

49. The continuous roll composite material of claim 48, wherein the inorganic fibers are selected from the group consisting of carbon fibers, graphite fibers, ceramic fibers, high temperature resistant glass fibers and refractory metal fibers.

50. The continuous roll composite material of claim 49, wherein the carbon fibers are derived from a precursor material selected from the group consisting of PAN, petroleum pitch and rayon.

51. The continuous roll composite material of claim 49, wherein the ceramic fibers are selected from the group consisting of silicon carbide, boron nitride, silicon nitride, alumina and alumino-silicates.

52. The continuous roll composite material of claim 48, wherein the inorganic fiber whiskers are selected from the group consisting of carbon whiskers and ceramic whiskers.